ESC 102

REQUEST FOR PROPOSALS

Reducing the Risk of Repetitive Strain Injury (RSI) in Toronto Public Library Workers

March 2, 2013

ABSTRACT

Repetitive strain injury (RSI) is caused from prolonged repetitive movements of the hands, wrists, arms or shoulders. [1] The community consisting of Toronto Public Library workers are at a high risk of developing repetitive strain injuries because they perform many repetitive tasks including the shelving, sorting and handling of books and materials. This becomes a problem as people suffering from RSIs experience pain and soreness in their hands, wrists, arms or shoulders which hinders their ability to work. [2] There exists treatment; however, it is a slow and inconvenient process. This ultimately affects the quality of life of the individuals of the community. The purpose of this RFP is to address this issue of RSI in Toronto Public Library workers by considering the stakeholders involved and to frame appropriate design requirements that allow for an engineering design solution towards the problem.

The primary stakeholders involved in this issue are the library staff and the City of Toronto along with the Toronto Public Library. The library staff members are the individuals directly affected by this issue, so their interest would be primarily in preventing the problem without affecting their regular tasks. The Toronto Public Library would wish to limit the costs involved as they have a limited budget and at the same time maintain the efficiency of their services. Other minor stakeholders include the worker's union, visitors, manufacturers and healthcare professionals.

The problem of RSI is framed around the repetitive process of shelving books performed by the library worker. This was specifically chosen because there are current solutions such as automatic book sorters and self-checkouts that address issues about sorting books and checking books in and out. It also sets up a very open design space, which can directly address the different causes such as grasping, reaching and lifting books. The design requirements are provided to both guide the design process and also to measure the effectiveness of the solution. This includes the ability of the solution to reduce RSI, its application in different branches, and its efficiency in maintaining book circulation, expenses involved, maintainability, safety and ease of operation.

[1] R. Hicks and T. Macnair, *Repetitive Strain Injury*, BBC Health, Aug. 2009. [Online]. Available: http://www.bbc.co.uk/health/physical_health/conditions/repetitivestrain1.shtml [Accessed: 2 Feb. 2013]

[2] C. Scott, *Repetitive Strain Injury*, University of Michigan, 6 Sep. 2011. [Online]. Available: http://web.eecs.umich.edu/~cscott/rsi.html [Accessed: 8 Feb. 2013].

Table of Contents

1. Introduction

There exists a need for developing an engineering solution to eliminate or mitigate the problem of "Repetitive Strain Injury" (RSI) in the workplace of the Toronto Public Library worker's community. In library staff, RSI results from overuse of the hands, wrist or back in performing repetitive tasks such as the constant handling, shelving and sorting of books. [1] A problem arises when this ailment hinders the ability of an individual to work effectively. This RFP serves to address the issue of RSI in the librarian community and to frame a set of detailed design requirements to outline a design space. To support this claim, background information about the community and the ailment will be provided. In addition, the various stakeholders involved with the issue will be addressed. An explanation of current solutions and requirements outlining the objectives, constraints and criteria are also provided both to guide the design as well as to set an appropriate scope of the targeted problem.

2. Background Information

This section of the report will go over the definitions of key terms used, the background information about our chosen community, the identified need and its effect on the quality of life of the members of the community. The provided information must be taken under consideration when proposing a potential solution.

2.1. Community

A community can be described as a group of people who live in a particular area, who share similar ethnic or cultural characteristics, who have common interests, or who work in the same learned profession. [3] The community that was identified was the Toronto Public Library workers. They serve as a legitimate community as by the definition stated above; they share a common profession. This community is further bounded by the city-limits of Toronto.

2.1.1. Legitimacy of Chosen Community

With approximately 19 million visits in 2011, the Toronto Public Library is the one of the busiest public libraries in the world. [4] The total annual visits count of the Toronto Public Library is more than the total visits count of the top ten attractions in Toronto including Canada's Wonderland, Roger's Centre, and Air Canada Centre. (Refer to Figure 1)

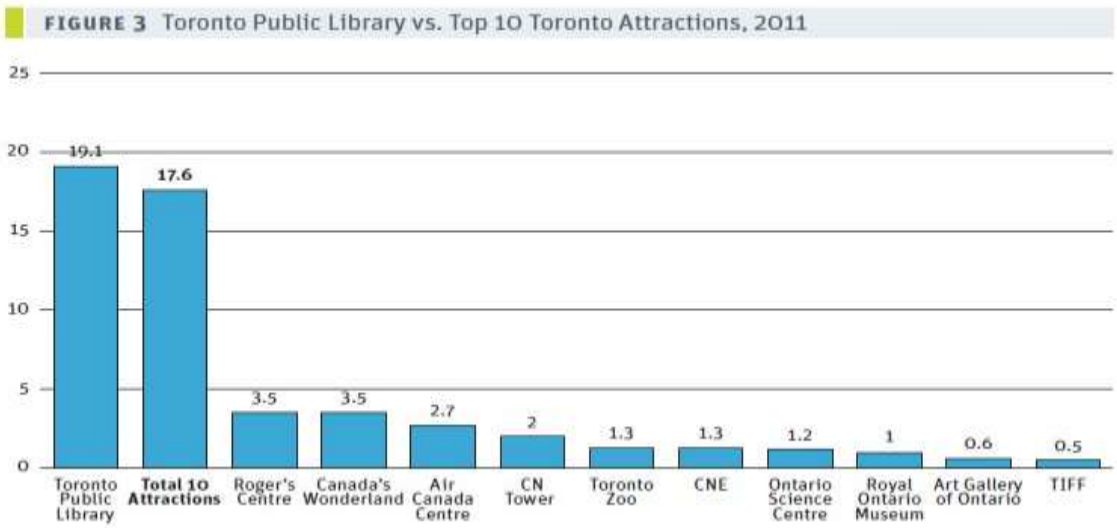

Figure 1: Toronto Public Library vs. Top 10 Toronto Attractions (millions of visits in 2011) [4]

In 2011, roughly 73% of Toronto residence used the public libraries at least once [4], and over 33 million books were circulated from branch to branch [5]. Torontonians have steadily exhibited a greater demand for library materials. [6] From a five year trend graph, it can be observed that the amount of visits to the public library and circulation of books is continuously increasing. (Refer to Figure 2)

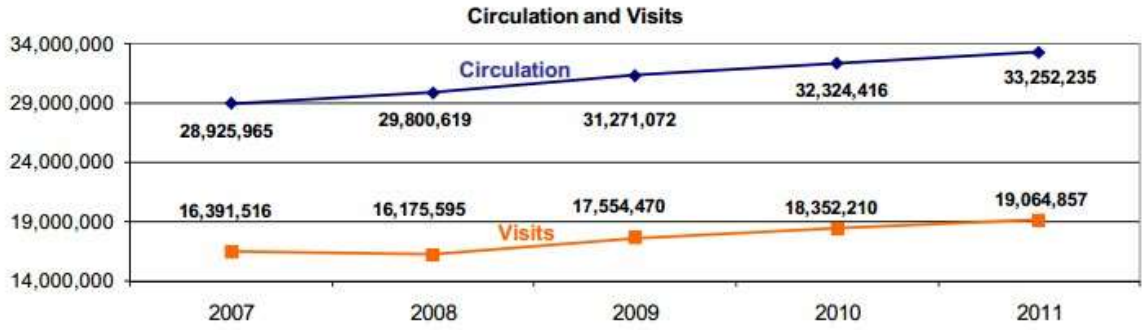

Figure 2: Graph of Circulation and Visits to Toronto Public Library between the years 2007-2011 [5]

In total, there are 98 Toronto Public Library branches comprised of over 2300 working staff. [7] As a result of the budget cut in 2010-2011, 18 library positions were eliminated. [4] Another deletion of 161 positions is expected as detailed in the 2012 Recommended Budget. [6] In theory, the librarian workers left are sufficient to maintain working procedures due to the reduction of the public library's open hours and the improved efficiency through the use of technological devices such as self-checkout devices and automatic sorting machines. [6] The President of the Toronto Public Library Workers' Union, on the other hand, believes otherwise. With more than 33% of the Toronto population over the age of 50, seniors are regular visitors to the public library. Furthermore, 67% of immigrants visited the public library frequently (once or more each month) in 2011. [8] Based on these two categories of visitors, it still seems

necessary to have library staff assisting the check-out processes; to have self-checkout devices replace library staff is inconvenient for these visitors who may rely on human assistance. Also, both the increasing number of visits to the library and the decreasing number of staff in the public servicing department contribute to providing the remaining library workers with more work (i.e. more tasks for each staff). [4][8] Therefore, it is essential that the needs of this community be addressed, as it would not only help the community itself, but also those dependent on its services.

2.2. Need

In 1943, Abraham Maslow wrote a paper establishing a hierarchy of needs, often referred to as "Maslow's Hierarchy of Needs". Essentially, he classified needs into different tiers including basic (physiological) needs, safety needs, love needs, esteem needs and self-actualization needs. [9] The need for preventing repetitive strain injury (RSI) would be classified as a "safety need" in Maslow's hierarchy and the improvement to the quality of life would be measured with respects to physical health.

2.2.1. Genuineness of Identified Need

Repetitive strain injury (RSI) is defined as cumulative trauma disorder stemmed from prolonged repetitive movements of hands, wrists, arms or shoulders. [1][10] Early symptoms include aching and fatigue. Once the problem grows in severity the patients begin to feel pain. [2][11] Treatment of RSI is usually resting the affected area, taking regular breaks, and physiotherapy. [1] In some severe cases, surgery is recommended if the doctor sees the conservative treatment being ineffective. [12] Figure 3 on the right shows a close-up of the thumb tendon and the stress on it which results from RSI. [13]

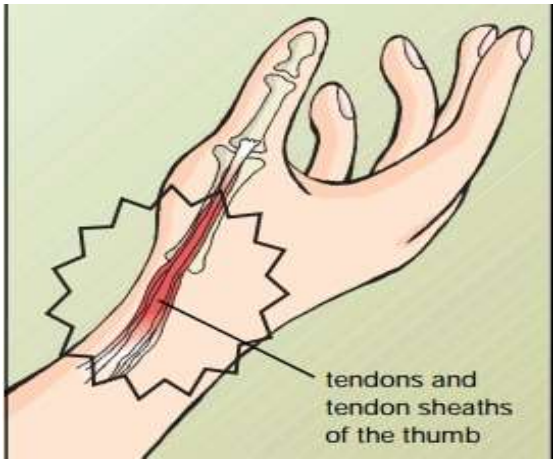

Figure 3: Base of the right thumb is under stress from RSI [13]

One of the primary risk factors of RSI is the over-usage of certain parts of the body. [2] In the year 2000, a health report published already indicated that one out of every ten Canadian adults had some form of RSI that is serious enough to limit their activities. [14] In the Toronto Public Library workers' community, 40% workers were reported to have RSI based on a rough estimate by the President of the Toronto Public Library Workers' Union. [8] RSI in the library workplace is mostly caused by constantly shelving and sorting books and/or working at the computers. [15][13] The risk of RSI is also greater when shelving books above shoulder level. [10] Figure 4 shows how a typical library worker shelves books. Notice that the top shelve is above the shoulder level. [16]

The height of the shelves as suggested by the U.S. Institute of Museum and Library Services is shown below in Table 1. [17] Based on the Ergonomic Design Guidelines for Libraries, it is recommended for repetitive reach to be limited to 163 cm (64”). [18] There is a high potential for library workers to develop RSI while shelving books on bookshelves over the recommended height of 64”. Furthermore, library workers who perform a pinch grip (a grip between the thumb and the tips of the fingers) while shelving books are also believed to place considerable stress on their hand muscles. [18] Therefore, it is essential to foster awareness of the need to maintain a good body position for library workers in order to reduce cases of RSI in the library workplace. [6][19][20]

Figure 4: Library Page Kathleen Roland shelving books [16]

Table 1: Recommended Shelving Heights in Libraries [17]

Volume Type	Recommended Unit Height
Reference	66”
Reference (High and Low)	42”/90”
Adult Fiction	90”
Adult Non-Fiction	90”
Children’s Picture Books	42”
Easy Readers	42”
Juvenile Fiction/Non-Fiction	66”
Young Adult	66”
Large Print	66”/78”
Current Periodicals	45”/66”

In Toronto, a library worker who both reports RSI and goes through the assessment by the Accommodation Plan Team is eligible for the Modified Work Program (See Appendix for Modified Work Program) [21]. The result is a shorter working time for the patients but implies longer working hours for the library workers who have not yet developed serious RSI. [8] This potentially increases the risk of RSI among the rest of the library workers. Moreover, library workers tend to not complain indicating a possibility of more library workers having RSI than what was reported. [22]

Most libraries focus on ergonomic issues which are believed to reduce the amount of physical strain experienced by library workers; [23] however, the number of library workers suffering from RSI seems to increase from year to year. [8] The majority (60%) of library pages, the main workers responsible for shelving, range from 14 to 24 years old. It is observed that there is a shift in the age group of library workers getting RSI. That is, more and more younger staffs are affected by RSI while the number of library workers who suffer from RSI in general increases. [8]

2.3. Quality of Life

The World Health Organization measured quality of life under the domains of physical health, psychological status, independence level, social relationships, environment, and spiritual and religious beliefs. [24]

RSI sets limitations to patients' activity; reports have shown that more than 50% patients with such chronic pain also suffer from depression or anxiety. [25] This greatly reduces the quality of life of the patients from both a physical and a psychological viewpoint. The RFP will focus primarily on measuring quality of life under the physical health domain with "an improvement in physical health" to denote a general improvement in the quality of life of library workers. [24]

3. Stakeholders

It is important to identify the stakeholders that would be affected by, or would take particular interest the problem and any subsequent solutions. In addressing the problem that we have isolated, there are many stakeholders who would be involved. The primary stakeholders are the library staff who would be directly affected, the City of Toronto, and Toronto Public Library. The secondary stakeholders are the Toronto Public Library Workers Union, library visitors, manufacturers of current and future library systems, and doctors.

3.1. Primary Stakeholders

These are the stakeholders who are directly affected by the problem and its solution.

3.1.1. Library Staff

Library Staff who are prone to RSI associated with the upper body are the primary target of this RFP. About 40% of library staff, as reported by the Health and Safety Committee of the Toronto Public Library, suffer from RSI mostly associated with arms, wrists, hands and shoulders. Also, as mentioned in Section 2.2.1, there is a higher percentage of staff than reported who actually suffers from RSI, as many library workers tend not to complain as they may blame themselves or they may be concerned about how such an admission would affect their current or future job prospects.[8] This problem is also more prevalent amongst younger staff, which makes it even more vital to prevent RSI and reduce its risks.[8]

Reducing the prevalence of RSI in library workers would increase the efficiency with which they can perform their tasks and also improve their overall quality of life.

3.1.2. The City of Toronto and Toronto Public Library

The City of Toronto has a major stake in this project as the budget for Toronto Public Library is adopted and approved by the City Council. As of 2011 and 2012, the City of Toronto is seeking to reduce the Library budget by introducing automated self-checkout systems and replacing Library staff. [5][26] The Toronto Public Library provides Health and Welfare coverage for permanent full-time workers and partial coverage for part-time workers (under the Illness and Injury Plan). [21] Full-time workers can claim up to $2400 per year in Medical costs, with a large portion of it aimed towards treating RSIs. [8] Thus, with a solution that seeks to reduce the risk of RSI in library staff, the costs related to Health benefits can be reduced over time and the burden of the Toronto Public Library on the City budget can be decreased without cutting any jobs.

3.2. Secondary Stakeholders

These are the stakeholders who are not directly affected by the problem or its solution, but have a smaller stake with regards to either the problem or its solution.

3.2.1. Toronto Public Library Workers Union

The Toronto Public Library Workers Union (TPLWU) comprises of the library staff as well as management staff that takes care of the rights of the workers and bargains with the City of Toronto in order to provide better benefits to the Toronto Public Library staff. [21] The TPLWU would be interested in reducing the risk of RSI as it is concerned about the health and safety of its members, particularly the library staff. [8]

3.2.2. Library Visitors

In 2011, the Toronto Public Library had 19.1 million annual visitors, which is more than the total number of visitors to all the major attractions in Toronto. [4] Library visitors would be indirectly affected positively if the efficiency with which library workers perform their tasks is increased. This can be achieved by reducing the risk and prevalence of RSI among library workers.

3.2.3. Manufacturers

The manufacturers of the current library equipment and systems would have a stake in any solution, such as RFID Canada, PV Supa, Smartag, and Dematic, as they would have a financial interest in the implementation of any technology in the Toronto Public Library. PV Supa and Dematic have developed a variety of automated library systems being used in Europe and North America, while RFID Canada and Smartag are associated with the tagging system used in self-checkout systems. [27][28] Development of new technology in related fields would affect the current agreements between RFID Canada, Smartag and the Toronto Public Library. [29]

3.2.4. Health Care Professionals

Health Care Professionals would be required to identify and possibly quantify any decrease in the risk of RSI in librarians. Also, the decrease in the prevalence of RSI would proportionally affect the dependence on doctors. Library workers with health problems have to submit a Work Information Form (See Appendix C) in order to seek treatment under their Health Benefits plan.

4. Current Solutions

Methods that are currently being used to prevent RSIs in library workers include improved ergonomics, frequent breaks and task rotation, and also automated systems.

4.1. Improved Ergonomics in Libraries

One of the methods to prevent RSI in the work environment is to improve the ergonomics of the work environment. [2][29] Companies such as Lyngsoe Systems and P.V. Supa manufacture library equipment such as carts and trolleys designed for ergonomics (refer to Figures 5 and 6). These "ergo trolleys" offer features such as electronically automated platforms, handlebars, and low friction wheels which make the jobs of the staff member more pleasant as the cart is easier to maneuver and there is no need to bend over to reach for books. [27][30] Unfortunately, these ergonomic trolleys are not widely used in the Toronto Public Library, possibly due to their higher cost with regards to operation and installation, smaller carrying capacity and more complex operational instructions compared to regular trolleys.

Figure 5: P.V. Supa's "Ergo Trolley" [25]

Figure 6: Lyngsoe System's "Ergo Cart" and "Ergo Trolley" [30]

Another ergonomic measure to prevent RSI is in the checkout counter. The Toronto Public Library uses radio frequency identification (RFID) technology in their self-checkout system, which involves placing the books on a sensory platform and interface with a touchscreen monitor to check out the materials (refer to Figure 7). [31][32] This is a significant ergonomic improvement over the previous barcode scanner system as it involves less movement of the hand and wrist making it more pleasant on the staff.

Figure 7: Self-checkout system introduced at a Toronto Public Library branch. Notice the touchscreen monitor, and sensory platform – a library worker is not necessary in this process.

4.2. Taking Breaks and Task Rotation

The Toronto Public Library has its staff trained to be able to perform all of the different tasks in the library, whether it be shelving materials, sorting materials, working at the checkout counter, etc. By doing this, they can rotate the tasks of each individual so that they do not repeat the same task over and over again. This helps prevent repetitive strain injury as library workers are not constantly performing the same motion and straining the same muscles.

In addition to task rotation, taking breaks has also shown to reduce the occurrence of RSIs. A study performed by the National Institute of Occupational Safety and Health has also been shown that taking short “micro-breaks” not only reduces discomfort while working, but may actually improve the efficiency of work. [33] Five-minute exercise breaks are suggested by physiotherapists for every 30 minutes of repetitive work. Other techniques towards reducing RSIs include maintaining good posture, stretching, and keeping muscles relaxed. [25][33][34]

4.3. Automated Library Systems

The Toronto Public Library has various automatic “book sorters”, most notably the large one developed by P.V. Supa at its Ellesmere Branch (refer to Figure 8). [26] This replaces the repetitive task of

manually sorting each book into the different book bins before shelving them, reducing the occurrence of RSI in the library workers. In addition, certain branches also use self-checkout system and an automatic book return system. [8] These technologies remove the need for the staff to manually scan the barcode of each book while checking books in or out, which reduces the strain in their wrists and hands.

Figure 8: Automatic book sorter at the Toronto Public Library Ellesmere Branch.

Fully automated library systems have been developed by a company called Dematic and are currently installed at the University of Chicago library, the University of British Columbia library, and Santa Clara University library amongst others. [28] All the books are sorted and stored inside specific “book totes” that are then placed onto shelves by an automated claw mechanism. To obtain a book, the user simply searches for the book at a computer connected to the system and the machine will bring the tote containing the book to one of the circulation counters where the user can then pick it up. These systems eliminate the need for library staff to ever have to handle the books which completely removes the potential for repetitive strain injury. However, these systems would not be appreciated in the public library system as not all library visitors would be accustomed to using a computer search to locate books of interest.

5. Scoping the Engineering Design Problem

In order to properly format a solution that would improve the quality of life of the library workers community, it is necessary to trace the root of the problem of RSIs in the community and decide where it would be appropriate to intervene. As mentioned earlier, one of the key causes of RSI in the staff was the

handling of books and other material. Figure 9 offers a visual representation of the book circulation cycle in the Toronto Public Library and indicates the different areas where the library staff would interact with the books: the check-in process, the sorting process, the shelving process and the checkout process.

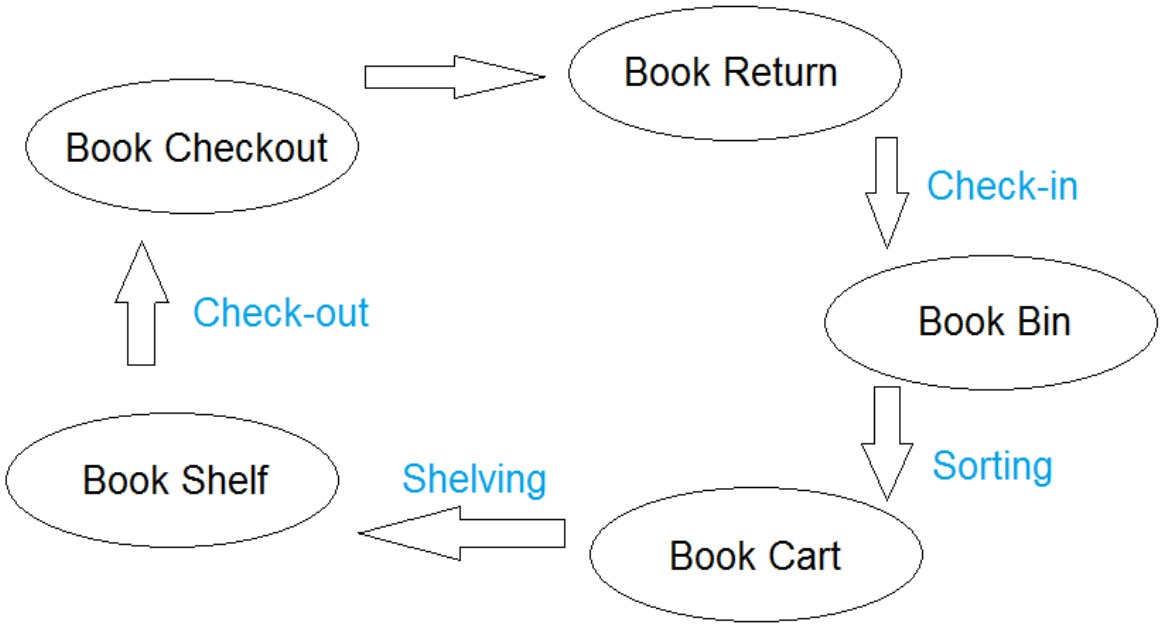

Figure 9: Diagram depicting the book circulation cycle at Toronto Public Library. Blue text indicates actions that library workers perform in each phase of the cycle.

Amongst the different areas, it was decided that the shelving process would be the most beneficial place to intervene (refer to Figure 10). This was largely due to the fact that there already exists technologies that reduce the risk of RSIs in the other areas. The Toronto Public Library employs automatic book check-in systems for returning materials as well as automatic book sorters for sorting the returned materials. [8][26] There are also self-checkout counters that are being used in different branches, which reduces the need of workers in that area. [8] The Toronto Public Library does not use any form of automatic shelving technology (like the kind developed by Dematic), so the library staff are still required to manually shelf the books. [35]

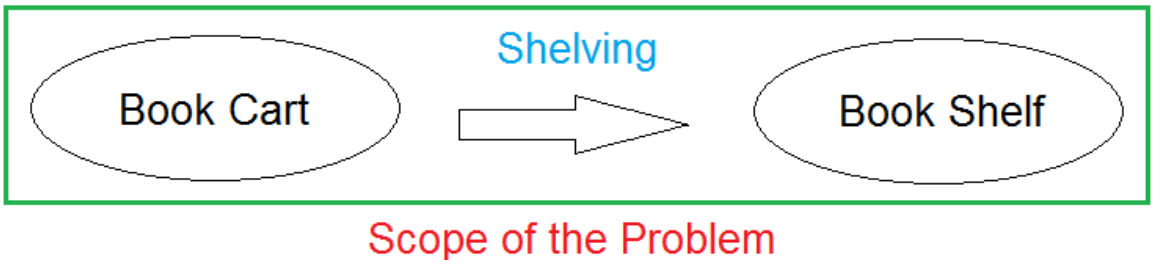

Figure 10: Proposed Scope of the Solution

The shelving process can be defined as the set of steps that are necessary to transport the book from the book cart onto the correct shelf in the library. It is assumed that the book cart is near the bookshelf where the books belong. The steps are as follows:

1. The specific level on the book shelf where the book is to be placed is identified.
2. The book that belongs to the specified level of the shelf is lifted off the book cart. This involves the "grasping" of the book by the hand and "lifting" of the book by the arm. Not all books are of the same size and weight, so that factor needs be considered as well. Along with that, to improve efficiency, multiple books to be placed in similar areas are usually lifted off the cart at once.
3. The book or books are brought to the level of the shelf where they are to be placed. Book shelves are of various heights, so the staff member may need to reach up with his/her arms or bend down to get to the appropriate level of the shelf.
4. The other books currently on the shelf are pushed aside to make room for the new book(s). This is usually done by using the free-hand or wrist.
5. The book(s) is/are inserted on the shelf. This involves the "releasing" of the book(s) by the hand.

Apart from step 1, all the other steps require exerting strength from the hand, wrist or arm muscles. Considering the 32 million circulated materials in 2010, this strenuous and repetitive task would be performed quite often by the staff, giving reason to believe that "shelving" would be a significant cause of RSI. [4] Each step explicitly defines a separate cause of RSI, so a design solution could choose only to focus on a single step. However, it is also possible to design a solution that addresses the issues from multiples steps of the process. The problem was ideally scoped to allow for this flexibility of design space. To further open up the design space, all "forms" of design solution (e.g. autonomous, assistance devices, etc.) would be accepted, so long as they do not violate the constraints defined in the Design Requirements section.

6. Design Requirements

The design requirements begin by listing the *high level objective* of the design solution in order to clearly outline what the solution design should be aimed to satisfy. Further specifics of the solution design are laid out in *detailed objectives*. Absolute limitations are categorized into *constraints* and achievement level descriptors are specified in *criteria*. The success of the proposed solution, provided it does not violate any constraints, and will be measured under the metrics listed in Section 6.2. [5][6]

6.1. High Level Objective

Design a feasible solution within the scope of the problem proposed in Section 5 that serves to improve the quality of life (as defined in Section 2.3) of the Toronto Public Library Workers' community (as defined in Section 2.1). The solution designed to reduce the risk of Repetitive Strain Injury in Toronto Public Library Workers should also be cost-efficient, durable, safe, easy to use and applicable to all Toronto Public Library branches.

6.2. Detailed Objectives and Requirements

The solution should aim to:

1. **Solve the problem of Repetitive Strain Injuries within the scope of shelving the materials from the book cart to the bookshelf.**

   Rationale:
   The design team is required to remain within the defined scope, as other major causes of RSI, such as Computer keyboards and mice, desks and chairs have already been addressed in an adequate manner. Also, the selection of the shelving process from amongst the different steps involved in book circulation (depicted in Figure 9) has already been justified in Section 5.

2. **Reduce the frequency of RSI amongst library staff and thus, improve shelving efficiency.**

   Rationale:
   It was identified in section 2 that RSI constituted a genuine need for the Toronto Public Library workers; hence, reducing the frequency and severity of RSI would improve the quality of life of the community. An improvement in shelving efficiency (which would be beneficial to multiple stakeholders) would also be seen as RSI can cause inability to work effectively.[20]

3. **Be safe (i.e. not pose a risk towards library workers, visitors and materials).**

   Rationale:
   The purpose of the solution is to increase the quality of life of the individual by ensuring their physiological security; if the solution is not safe, it defeats the whole purpose. The library is also a public place attracting 19 million visits annually, so the visitors as a stakeholder would want to ensure their personal safety.[3] Finally, the solution should aim to avoid damaging library materials (especially books) as that would bring about unnecessary expenses towards the library.

4. **Be applicable to all Toronto Public Library branches.**

   Rationale:
   It is logical that the solution is expected to be applicable to all the Toronto Public Library branches, as RSI is prevalent in library workers in all branches, and not limited to just a few of them. [8][20] Also, as no infrastructural changes are expected to be made, it is reasonable to expect the solution to work for all branches.

5. **Minimize the Library expenses associated with RSI.**

   Rationale:
   The Toronto Public Library is funded by the City of Toronto, and has a limited budget. [5][35] The administration sets apart about $30,000 annually to deal with the problem of RSI amongst its

staff. [8] In the current economic condition of the City of Toronto, and its prerogative to cut costs, it would be highly recommended that the cost of implementing the solution be less than $30,000 annually, as it would help reduce the burden on the Toronto Public Library in the long run.

6. **Be simple to operate/use.**

   Rationale:
   The problem with ergo trolleys and automated library systems is that they were more difficult to operate than traditional trolleys. Also, library workers are not necessarily accustomed to complex systems, as it is not part of the job-description, so a simple solution would be preferable. [21]

7. **Be durable and easy to maintain over a long period of time.**

   Rationale:
   The solution is expected to durable and easy to maintain so that the Toronto Public Library does not have to need to incorporate additional expenditure with regards to maintenance into its budget. [36]

The relevant objectives, criteria, metrics and constraints are included in Table 2, based on the rationale provided for each objective.

Table 2: Breakdown of Objectives and Related Criteria, Metrics and Constraints for the solution

Objectives	Criteria	Metrics	Constraints
Reduction in frequency and severity of RSI	Lesser number of library workers affected by RSI is better	Ratio of librarians with RSI before the solution is introduced and afterwards	There must be a decrease in the frequency of RSI based on current statistics regarding the number of librarians affected, and as assessed by a Healthcare professional. [8][12]
Applicability to Toronto Public Library branches	More number of branches in which solution is applicable is better.	Number of Toronto Public Library branches in which solution can be implemented	N/A
Minimizing library expenses associated with RSI	The amount of money devoted towards dealing with RSI related issues, where less is better.	Canadian Dollars	The money spent on implementing the solution must not exceed $30 000, as that is an upper limit for annual RSI reduction projects. [8]
Durability and ease of maintenance	The life span of the design, where the longer is better.	Average time period between repairs or replacement, in months	N/A

Efficiency in shelving books	The number of books that a library worker can shelve in a given amount of time, where more is better	Ratio of number of books shelved with the solution compared to the number of books shelved without the solution	The ratio of number of books shelved with the solution compared to the number of books shelved without the solution must not be less than 1.
Operational simplicity	The ease with which a library worker will be able to effectively employ the solution towards the shelving process, where easier is better.	Number of hours required to learn the operational mechanism of the solution	The time required to learn the operational mechanism of the solution must be less than the time required to hire and train a new library worker.

Additional Constraints:

1. There must not be any changes towards the static infrastructure (including bookshelves) of the library.
2. The design must not pose a potential safety hazard towards both library workers and visitors. [19]
3. The design must not interfere with the circulation of books within the library or hinder the other processes in the book circulation cycle depicted in Figure 9.
4. The design must not replace the library worker in the task.
5. The design must not damage the library books or materials.

7. Conclusion

It is now evident that “Repetitive Strain Injury” (RSI) is a significant issue in the Toronto Public Library worker’s community and needs to be addressed appropriately. In particular, it is necessary to focus on the problem of “shelving materials” as that has proven to be a notable source of injury. Key requirements that must be addressed in the design solution include the effectiveness of eliminating or mitigating RSI in the community, the feasibility of applying the solution to many Toronto Public Library branches, and the overall effect the solution may have towards the flow of the shelving process. The role of the stakeholders (as identified in Section 3) also needs to be considered and, if justified and necessary, the requirements can be modified to further satisfy their involvement. Certain relevant designs have been provided in Section 4 to serve as guidelines. Henceforth, it is the responsibility of the design team to deliver an effective engineering solution towards the issue of RSI in the library workers’ community.

Appendix A - Meeting with Maureen O'Reilly

February 15, 2013
(9:40 am – 11:00 am)

The following is the transcript of an interview with Maureen O'Reilly, President of the Toronto Public Library Workers Union. We had sent her a list of questions we intended to ask and she provided us with statistics and information packets which were referred to during the interview.

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Maureen: *You refer to librarians a lot; it's really library staff. I have statistics for you on the demographics questions you have but it's broken down for the library staff in general, so not only for librarians. Especially the people who get RSI the most are the public services assistants; they are the people who do the circulation, so that's the main area. The librarians do some circulation but not as much as the public services assistants.*

Question: Do you have the statistics?

You wanted the breakdown of male and female. Its 75% female workplace vs. 25% male…Theoretically I can't give you this report because it is the library's and it has stamped here not for circulation. But it's a Diversity Initiative Workplace Survey that was done Toronto Public Library in 2011.

Would this be the most recent version?

This is the only one they've ever done. They got rid of the manager overseeing this. We were never able to publish it and complete it.
Do you need anything else in respect to the demographics?

This is good, thank you. We also wanted to know about the health care related to health benefits for the librarians?

I can copy this part of the Collective Agreement for you. All this standard health care attached to any unionized workplace, so in respect to the RSI, there's certainly physiotherapy and they are called the paramedicals. In particular, we have a sick leave plan. We have two but we are in the process of phasing out one.
Accumulative Sick plan 1.5 days/month for up to 18 days a year. There's another one called Illness and Injury Plan which most people are on, and that provides them with a percentage of days based on their length of service or their seniority.
Do you have a record or approximation of how many people are taking each plan?

They told us when they were bringing in the plan. I think it's 80-20.

80 for which one?

The new one; that was part of the 2009 Collective Bargain when the city wanted to move to the Illness and Injury plan as a cost saving efficiency over the Cumulative Sick plan. It's the same issue with the Teacher's Union right now. When you retire, you get a payout. Collected to the benefits, I'll make a copy of all the benefits stuff for you. I guess with respect to the RSIs would be the services of the following professionals, which we call paramedicals; so the chiropractors physiotherapist. There's a whole variety

of them. And it gives the amount that we get, so you can get up to $2400 a year and it tells you how it's divided in there. And there's stuff for orthopedic devices…

There's a Modified Work Program, which is the most important thing. It's for people who basically have some mobility issue, and this is mainly where the RSIs are addressed. If you have severe RSI issues, and doctors say it's in the wanding of the books and the handling of the books is stressful as you very well know. So doctors document and often what the resolution is, they can only work shorter periods on a desk. Again it's normally a circulation desk and so they might, instead of working 3 hours, they might work 1 hour on, then off, then on. And if it's severe enough, their workday might get compressed. The average worker works 35 hours/day, 7 days/week on average. If they are on modified work, it could also mean they have shortened hours, maybe 6hours/day; the other hour will be covered by the work plan.

How do you determine the severity of the condition? Is a doctor's diagnosis?

Yes. If you have an issue, you would let your supervisor know in a modified work meeting. Or you could tell the Union and we'd get the process rolling. There's a modified work team assigned to you and it consists of a union member, the manager, and a member of human resources. They basically get together and develop a plan that's agreeable to all the party and of course the worker. But it has to be substantiated by a doctor's note; I can get you that work information form…
There's a process in place, that once the employee signals they have an issue a formalized team handles it. The big thing that the employees look for is the length of time. It's divided into short term and long term. Short term is like if you fall or something and a modified work program would apply for a month. The RSI might be forever or just short term. Once you get into the MWP, you would meet on a regular basis to review the program with the same group. Before some manager would just do it on their own so there's an inconsistent approach. We brought this language in 2005. We've always had this, but the most comprehensive part of this was in 2005 where it was flushed out to this extent.

So there was one before this?

Yes, but it wasn't as centralized and formalized.

How many people would report to suffer from RSI?

I asked Camellia, who is on the Health and Safety Committee which this would fall under, and she said about 40% has been reported. And as part of the Health and Safety Committee, we have two sub committees, and one of these sub committees is an ergonomics team. So they are meeting a couple times a year to just review the programs and development of desks and book trucks are a huge thing, and delivery boxes…everything connected to the workflow. We've gotten in these automatic sorters, anything that will affect the workflow of the worker, they will look at it because there's a specialized team that will look at it a bit more and their recommendations will go back to the Health and Safety Committee.

What about the self-checkout?

Toronto Public Library's goal is to have 90% of checkouts done by self-checkout. This is one aspect that the union and the employer differ. The employer wants to invest in the technology in order to help with the RSI issues in the workplace; which is true enough, we understand and appreciate that. However, that is now being used as a tool to eliminate staff. They don't have as many people assisting people and patrons and it is becoming more of an automated process.

How many librarians would be working in a given library at once?
Well there are 98 different branches and 146 different workplaces, so probably 2.5 FTEs all the way up to

60 at a big library, then you have the reference libraries in North York Central which would have couple hundred people in them.

Do they shift/rotate their jobs for shelving books and desk work?

Yes they do. There's no set guidelines for that, it's really based on the staffing you have at one point. Prior to amalgamation, you wouldn't have people working at a desk for the whole day; you would have circulation work and workroom work. Instead of doing 7 hours on the circulations desk, you may have an hour on book repairs, and an hour on something else; good variety. With the shortage of staff, that has resulted, we have lost 25% of our staff since 1992 so despite the introduction of the self-service checkout, staff that are left are spending more and more time on the desks. Whether the front desk service/public area, or behind the scenes work, they are still involved with circulation.

Do you think the technology is helping the librarians?

I think it is, but it is masked with the short staff. My personal opinion is that you aren't going to get the full benefits of the self-serve technology because of the shortage of staff. They have never presented statistics that the technology warrants a decrease of 25% of the staff. They just introduce the technology, they use it as an excuse to get rid of the staff, but the reduction of staff is always connected with the budget demands. 60% of the branches in Toronto now have self-serve checkout. They won't be able to install it everywhere because physically the technology takes a lot of room and some of the smaller branches do not have enough room for the hardware.
…

When was the automatic sorter implemented?

The first one was 3 years ago; the other ones were two years.

Is this mainly because of budget cutting? What was the logic of the people who implemented this?

The big thing at Ford administration … has become efficiencies. The union doesn't object to the introduction of the technology, but we think it should be a support to the staff rather than the replacement of the staff. My personal view as the president is that there are a lot of newcomers and seniors who struggle with the self-serve technology and there are not a lot of staff left to personally help them. I think a library service is a SERVICE. I think it's important to have the staff to provide that service.
…
Obvious RSI is a huge issue for library worker…wanding and checking out books…It changes every couple of years; before they used to have a wand, and the barcode was there. At one time you'd have to wand the barcode, then they got a scanner and you'd just have to press it, and then the hand-held scanner, where you just hold it under the light, then the pad, so you just put the book on it…so you aren't doing one item at a time, and you aren't doing that waving motion. For sure, there are benefits to the technology but it's still too early in the game to see if it reduces the 40% with RSI, and again I think that will be negated by the reduction of the staff so more people are doing more things, so more people would be injured.

Is the injury going to be more severe for the librarians left?

I think so. The thing I've noticed in the past decade is that more and more younger people are getting RSI. Even the pages, who aren't theoretically doing large volume of circulation, they are mainly doing the shelving and the delivery boxes, that more of them are getting injured. At one time it would only be long term staff, I don't have any statistics for that, but my impression is if you were here for a long time, you'd get RSI. Now it seems to be happening more frequently and to younger workers.

…
The two things that they've recently implemented for ergonomics are ridiculous. They want to get rid of book trucks because they don't feel like they are efficient.
…
The books come in and you sort them on the book trucks, you know fictions, etc….you wheel the book truck out, and the page shelves them and you might have three hours to do three book trucks. Now they've actually taken away book trucks. The deliveries come in, in these great big grey boxes, and they're heavy. So for the drivers of the trucks who do the delivery, the weight of these boxes is huge. Some of the bigger branches get 60/70 boxes/day. They have to be unloaded. At one point they would be unloaded onto the book trucks but now the book trucks are no longer cool. So what they are trying to tell the librarians now; you have to shelf the books right from the box.

Were the books already sorted in the box?

No. I guess you wander aimlessly around the library until you finish sorting. But they think that's efficient, because they can tell City Hall that no one is standing there for 10 minutes sorting the books.

But that 10 minutes could save an hour of wasted time walking in the library…

I agree. And I think there's going to be more injuries now because there are people constantly bending down into these boxes and that was always a concern anyways for the people who did the deliveries. And again there are all these ergonomics rules about how to lift these boxes, how to fill them up, etc. With the automatic sorters, the sorters come with an automatic forklift to help the staff….That's going to be a health issue and it's certainly not efficient, it's not helping anyone at all.
…
The ergonomic team has an ergonomist that the librarians use through the MWP if you need someone to come in and look at your work space. The library is committed to a certain extent to provide that service.

Is this only after you have the RSI?

Yes, because this is on a 1-1 bases. Theoretically, whenever a library is built or renovated, they will be concerned with the ergonomics of the set up. But a lot of the older libraries don't have this in place and it just depends on the individual and their needs.

(Goes on to talk about the importance of the Toronto Public Library)

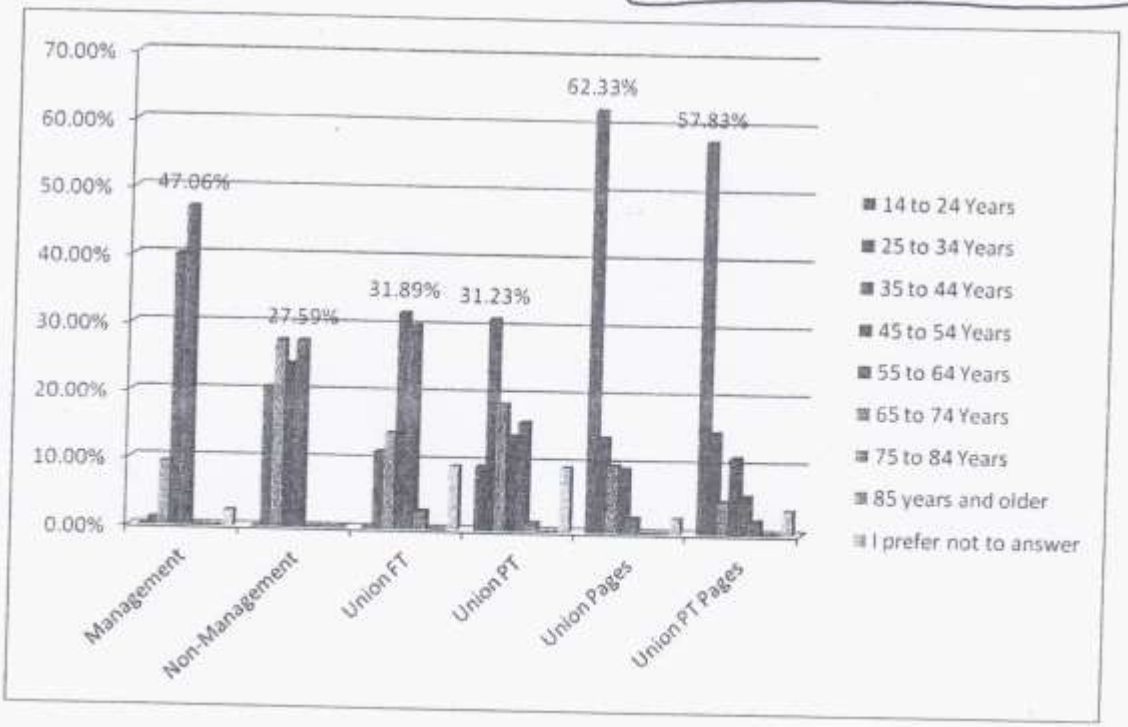
How do you think the health coverage for the librarians is compared to other places?
Yes it's good for full time staff. Part time staff don't have access to benefits. Right now there is a 60-40 split, so the employer pays for 60% of the cost for the benefit plan…The library is moving towards a model that has more and more part time workers, they are saving on those benefits costs, because most of the part timers don't take up the option for the benefits because it's too costly…

***

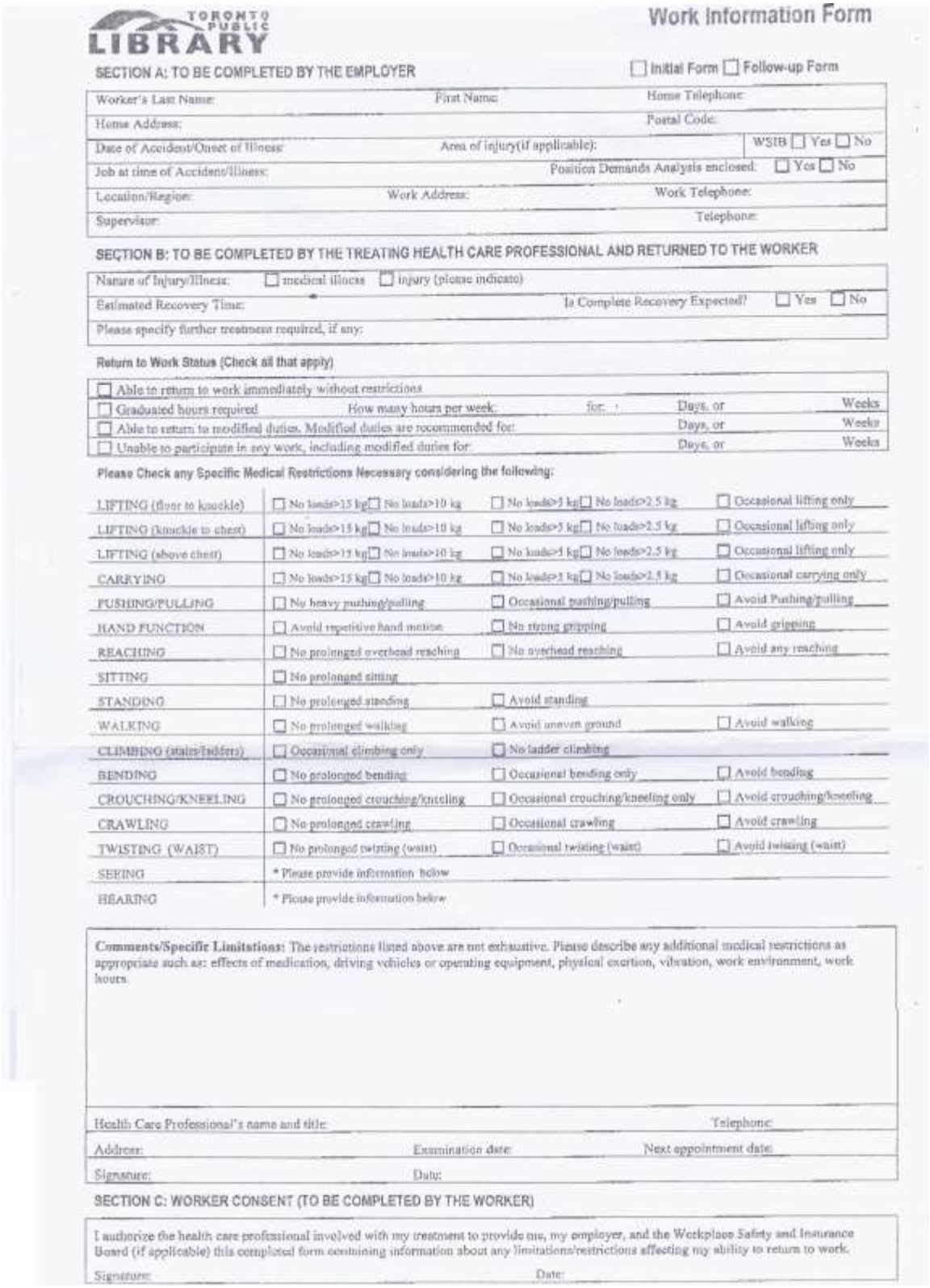
Appendix B – Library Staff Age Demographics [37]

2. Age Group

	Management	Non-Management	Union FT	Union PT	Union Pages	Union PT Pages
14 to 24 Years	0.00%	0.00%	0.38%	9.45%	62.33%	57.83%
25 to 34 Years	1.18%	20.69%	11.42%	31.23%	13.90%	14.86%
35 to 44 Years	9.41%	27.59%	14.15%	18.64%	9.87%	4.82%
45 to 54 Years	40.00%	24.14%	31.89%	13.91%	9.42%	11.24%
55 to 64 Years	47.06%	27.59%	30.00%	16.01%	2.24%	5.62%
65 to 74 Years	0.00%	0.00%	2.74%	1.31%	0.00%	2.01%
75 to 84 Years	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
85 years and older	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
I prefer not to answer	2.35%	0.00%	9.43%	9.45%	2.24%	3.61%



Appendix C – Library Work Information Form [38]



TORONTO PUBLIC LIBRARY

Work Information Form

SECTION A: TO BE COMPLETED BY THE EMPLOYER ☐ Initial Form ☐ Follow-up Form

Worker's Last Name:	First Name:	Home Telephone:
Home Address:		Postal Code:
Date of Accident/Onset of Illness:	Area of injury(if applicable):	WSIB ☐ Yes ☐ No
Job at time of Accident/Illness:		Position Demands Analysis enclosed: ☐ Yes ☐ No
Location/Region:	Work Address:	Work Telephone:
Supervisor:		Telephone:

SECTION B: TO BE COMPLETED BY THE TREATING HEALTH CARE PROFESSIONAL AND RETURNED TO THE WORKER

Nature of Injury/Illness: ☐ medical illness ☐ injury (please indicate)			
Estimated Recovery Time:		Is Complete Recovery Expected? ☐ Yes ☐ No	
Please specify further treatment required, if any:			

Return to Work Status (Check all that apply)

☐ Able to return to work immediately without restrictions				
☐ Graduated hours required	How many hours per week:	for:	Days, or	Weeks
☐ Able to return to modified duties. Modified duties are recommended for:			Days, or	Weeks
☐ Unable to participate in any work, including modified duties for:			Days, or	Weeks

Please Check any Specific Medical Restrictions Necessary considering the following:

LIFTING (floor to knuckle)	☐ No loads>15 kg ☐ No loads>10 kg	☐ No loads>5 kg ☐ No loads>2.5 kg	☐ Occasional lifting only
LIFTING (knuckle to chest)	☐ No loads>15 kg ☐ No loads>10 kg	☐ No loads>5 kg ☐ No loads>2.5 kg	☐ Occasional lifting only
LIFTING (above chest)	☐ No loads>15 kg ☐ No loads>10 kg	☐ No loads>5 kg ☐ No loads>2.5 kg	☐ Occasional lifting only
CARRYING	☐ No loads>15 kg ☐ No loads>10 kg	☐ No loads>5 kg ☐ No loads>2.5 kg	☐ Occasional carrying only
PUSHING/PULLING	☐ No heavy pushing/pulling	☐ Occasional pushing/pulling	☐ Avoid Pushing/pulling
HAND FUNCTION	☐ Avoid repetitive hand motion	☐ No strong gripping	☐ Avoid gripping
REACHING	☐ No prolonged overhead reaching	☐ No overhead reaching	☐ Avoid any reaching
SITTING	☐ No prolonged sitting		
STANDING	☐ No prolonged standing	☐ Avoid standing	
WALKING	☐ No prolonged walking	☐ Avoid uneven ground	☐ Avoid walking
CLIMBING (stairs/ladders)	☐ Occasional climbing only	☐ No ladder climbing	
BENDING	☐ No prolonged bending	☐ Occasional bending only	☐ Avoid bending
CROUCHING/KNEELING	☐ No prolonged crouching/kneeling	☐ Occasional crouching/kneeling only	☐ Avoid crouching/kneeling
CRAWLING	☐ No prolonged crawling	☐ Occasional crawling	☐ Avoid crawling
TWISTING (WAIST)	☐ No prolonged twisting (waist)	☐ Occasional twisting (waist)	☐ Avoid twisting (waist)
SEEING	* Please provide information below		
HEARING	* Please provide information below		

Comments/Specific Limitations: The restrictions listed above are not exhaustive. Please describe any additional medical restrictions as appropriate such as: effects of medication, driving vehicles or operating equipment, physical exertion, vibration, work environment, work hours.

Health Care Professional's name and title:		Telephone:
Address:	Examination date:	Next appointment date:
Signature:	Date:	

SECTION C: WORKER CONSENT (TO BE COMPLETED BY THE WORKER)

I authorize the health care professional involved with my treatment to provide me, my employer, and the Workplace Safety and Insurance Board (if applicable) this completed form containing information about any limitations/restrictions affecting my ability to return to work.

Signature: Date:

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